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**NEW PATENT CLAIMS FOR US APPLICATION**

1. Apparatus for measuring human blood sugar levels,  
comprising:

a catheter, the free end of which is positioned in a  
blood vessel, wherein the catheter comprises at least  
one optical waveguide,

a light source for coupling light into the at least one  
optical waveguide,

a measurement point at the free end of the catheter at  
which point the light is emitted from the at least one  
optical waveguide, wherein the light is dispersed by the  
blood and/or transmitted through the blood and wherein  
the dispersed and/or transmitted light is coupled again  
into the at least of one optical waveguide,

a detector to receive the light which is returned,

a computer unit for analysing the light received by the  
detector, and

a cleansing device located at the point of measurement  
for removing the tissue particles deposited from the  
blood,

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wherein the cleansing device comprises a controllable actuator which frees or wipes clear a light emission orifice of the at least one optical waveguide when activated.

2. Apparatus according to claim 1, wherein the cleansing device is controllable by the computer unit.
3. Apparatus according to claim 1, wherein the movement of the actuator is generated by a shape memory alloy, a thermopneumatic drive, an electrostatic drive (piezoelement) or a rotor.
4. Apparatus according to claim 1, wherein the actuator comprises a piston which is inserted into a form-fitting opening located at the free end of the catheter and which moves between a position where it forms a seal flush with the catheter surface and a position where it fits into a recess located opposite the catheter surface, and that in the recessed position a light emission orifice of the at least one optical waveguide becomes free.
5. Apparatus according to claim 4, wherein the piston is guided radially within the catheter.
6. Apparatus according to claim 4, wherein the piston is guided axially within the catheter.
7. Apparatus according to claim 4, wherein the piston can be actuated by a micromotor with a crank drive and that the control line comprises an electrical control line.

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8. Apparatus according to claim 4, wherein the piston can be actuated by a lifting magnet.
9. Apparatus according to claim 1, wherein the control action is achieved by means of an electrical control line.
10. Apparatus according to claim 1, wherein the control line consists of a hydraulic or pneumatic line which is effectively connected to the piston, whereby a linear actuator is integrated to exert a force on the control line.
11. Apparatus for measuring human blood sugar levels, comprising:
- a catheter, the free end of which is positioned in a blood vessel, wherein the catheter comprises at least one optical waveguide,
  - a light source for coupling light into the at least one optical waveguide,
  - a measurement point at the free end of the catheter at which point the light is emitted from the at least one optical waveguide, wherein the light is dispersed by the blood and/or transmitted through the blood and wherein the dispersed and/or transmitted light is coupled again into the at least one optical waveguide,
  - a detector to receive the light which is returned,
  - a computer unit for analysing the light received by the

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detector, and

a cleansing device located at the point of measurement for removing the tissue particles deposited from the blood,

wherein the cleansing device is constituted by a controllable ultrasonic generator which emits ultrasonic waves when activated in such a way that the light emission orifice of the at least one optical waveguide is freed of deposition when activation occurs.

12. Apparatus according to claim 1, wherein the energy required for control purposes is supplied to the point of measurement in electrical, thermal, optical, mechanical, hydraulic or pneumatic form.
13. Apparatus according to claim 1, wherein the measurement at the point of measurement is undertaken by means of transmission (irradiation over a specified sampling length) or by means of diffuse reflection from the surface of the catheter.
14. Apparatus according to claim 1, wherein the catheter is clad with a biocompatible material.
15. Apparatus according to claim 14, wherein the catheter and the optical waveguide are designed as a single piece of solid material.
16. Apparatus according to claim 1, wherein the light source, the detector and the computer unit is integrated into the implant together with an energy store for

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providing voltage.

17. Apparatus according to claim 16, wherein a telemetry unit is integrated into the implant with which it is possible to transmit data and/or energy between the computer unit and a control unit located extracorporeally with a probe for that purpose.
18. Apparatus according to claim 17, wherein the telemetry unit and the probe have an oscillatory circuit each with an inductor, wherein the oscillatory circuit on the side of the telemetry unit and the oscillatory circuit on the side of the probe can be tuned for the transmission of data and that the data are transmitted without direct contact by coupling the inductors inductively.
19. Apparatus according to claim 17, wherein the energy content of the frequency transmitted by the control unit to the telemetry unit charges an accumulator or a capacitor for the purpose of providing energy to the implant.
20. Apparatus according to claim 16, further connected to:
- a control unit located extracorporeally for regulating human blood sugar levels, wherein the measured values are transmitted by a telemetry unit to said control unit,
  - an extracorporeal insulin pump for injecting insulin through the peritoneum, and
  - a regulator integrated into the control unit which

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controls the insulin pump subject to the measured values  
in such a way that the desired blood sugar level is  
attained.

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